Part-III: Subjective:	This section will contain two long questions bifurcated in two-parts **a & b** (carrying 4 marks each) and students have to attempt one question. The detail is as follows: **Q-8:** **(a)** One long-answer question will be selected from chapter 6. **(b)** One long-answer question will be selected either from chapter 8 or chapter 11. **Q-9:** **(a)** One long-answer question will be selected from chapter 10. **(b)** One long-answer question will be selected either from chapter 9 or chapter 12.	$1 \times 8 = 8$

MODEL PAPER OF MATHEMATICS FOR GRADE-10

Annual Examination 2027 — Smart Syllabus / ALP Academic Session 2026-27

OBJECTIVE TYPE

Time Allowed: 20 mins. **Max. Marks: 15**

Note: Encircle the correct answer. Each question carries one mark.

Cutting or overwriting in an MCQ cancels that answer. **(1 × 15 = 15)**

No.	Questions	A	B	C	D
i	Imaginary part of $(2 - i)(2 + i)$ is:	0	1	7	9
ii	Sum of the roots of $3x^2 + 5x - 12 = 0$ is:	$\frac{5}{3}$	$-\frac{5}{3}$	$\frac{12}{3}$	$\frac{3}{5}$
iii	If $A = \begin{bmatrix} 3 & 1 & 3 \\ 2 & 0 & 2 \end{bmatrix}$, then order of A^t is:	3-by-2	2-by-3	3-by-3	2-by-2
iv	If $f(x) = x^2 - 4$, $g(x) = x + 2$, $x \neq -2$, then $\frac{f(x)}{g(x)} =$	$\frac{1}{x - 2}$	$\frac{1}{x + 2}$	$x + 2$	$x - 2$
v	Lowest form of $\frac{18a^2bc^2}{12ac}$ is:	$\frac{9abc}{6}$	$\frac{3abc}{2}$	$\frac{18b}{12}$	$\frac{3}{2}$
vi	What is the value of $\lvert 3\underline{i} + 4\underline{j} \rvert$?	3	4	5	7
vii	cosec θ is positive in:	I & III quadrants	II & IV quadrants	I & II quadrants	I & IV quadrants
viii	A chord passing through the centre of the circle is called:	radius	diameter	secant	circumference
ix	In a circle, radius and tangent are:	parallel	equal	perpendicular	zero
x	What is the measure of an angle inscribed in a semi-circle?	45°	60°	90°	120°

No.	Questions	A	B	C	D
xi	Tangents drawn from a single external point to a circle are:	unequal in length	perpendicular to each other	equal in length	inside the circle
xii	Difference between the highest and the lowest values is called:	mean	variance	range	standard deviation
xiii	Variance of the data 8, 8, 8, 8, 8, 8 is:	0	16	8	48
xiv	If one coin is tossed and one dice is rolled, then the number of sample points are:	3	6	2	12
xv	If $P(E) = 0.07$, then the probability of 'not E' is:	0.95	0.89	0.93	0.90

SUBJECTIVE TYPE

Time Allowed: 2:10 hrs. **Max. Marks: 60**

(Part-I)

2. Attempt any SIX of the following: (Units 1, 2, 3 & 4) **(2 × 6 = 12)**

(i) Simplify: $\left(\frac{i^8}{i^5}\right)^{-5}$

(ii) Find the values of a and b, if $(a + bi)(1 + 3i) = -8 + 11i$.

(iii) Solve the quadratic equation by factorization method: $6x^2 + 13x - 5 = 0$

(iv) Form a quadratic equation whose roots are $3 + \sqrt{5}$, $3 - \sqrt{5}$.

(v) If the quadratic equation $16x^2 + 7px + 49 = 0$ has equal roots, then find the values of p.

(vi) If $X = \begin{bmatrix} 1 & -1 \\ -2 & 2 \end{bmatrix}$ and $Z = \begin{bmatrix} 3 & 0 \\ 0 & -2 \end{bmatrix}$, then find $4X - Z$.

(vii) Find the value of x when $A = \begin{bmatrix} x & 6 \\ 5 & 15 \end{bmatrix}$ is a singular matrix.

(viii) Given that $f(x) = 3x + 2$ and $g(x) = 2x + 3$. Find $f(g(-2))$.

(ix) Solve and express the solution on number line: $|7 - 2x| = 1$

3. Attempt any SIX of the following: (Units 5, 6, 7 & 8) **(6 × 2 = 12)**

(i) Reduce to lowest form: $\frac{3x^2 + 6x}{x^2 + 4x + 4}$

(ii) Simplify: $\frac{2}{x + 2y} - \frac{x - 6y}{x^2 - 4y^2}$

(iii) Write the vector $\overline{AB}$ in the form $x\underline{i} + y\underline{j}$, where $A(1, -7)$ and $B(-2, 4)$.

(iv) Find a unit vector in the direction of the vector $\underline{a} = 6\underline{i} + 8\underline{j}$.

(v) If $\underline{a} = \underline{i} + 3\underline{j}$, $\underline{c} = 2\underline{i} + \underline{j}$ and $\underline{a} + 2\underline{b} = \underline{c}$, then find $|\underline{b}|$.

(vi) Without using calculator, find the exact value of cot 120°.

(vii) Calculate area of triangle ABC, in which $a = 7$ cm, $b = 8$ cm, $\gamma = 38°$.

(viii) A chord 8 cm long is at a distance of 3 cm from the centre. Calculate the radius of the circle.

(ix) In a circle with centre at O, the perpendicular distance of the each chord PQ and RS from the centre is 6 cm. If the length of chord PQ is 18 cm, find the length of the other chord.

4. Attempt any SIX of the following. (Units 9, 10, 11 & 12) **(6 × 2 = 12)**

(i) In a historical monument, a circular fountain with a radius of 3 m is built. A flagpole is erected 7 m away from the centre of the fountain. Two ropes from the pole are tied to the edge of the fountain, just touching it. Find the length of each rope.

(ii) Find ℓ and area of sector, when $r = 1.7$ cm, $\theta = 0.25$ radian.

(iii) Construct a circle with the help of given radius $r = 1.7$ cm.

(iv) Take any three non-collinear points P, Q, R and construct a circle passing through these points.

(v) Draw the box-and-whisker plot, if min. value = 12, max. value = 26, median = 19, $Q_1 = 14$ and $Q_3 = 24$.

(vi) Find the range of the data set: 63, 89, 98, 125, 79, 108, 117, 60

(vii) A librarian recorded the number of visitors during 5 days of a week: 120, 135, 130, 125, 140. Calculate the variance and standard deviation of visitors.

(viii) Find the probability of getting a sum of 5 or 7 in a throw of two dice.

(ix) If A and B are two mutually exclusive events of a random experiment and $P(\text{not } A) = 0.45$, $P(A \cup B) = 0.65$, then find $P(B)$.

(Part-II)

Note: Attempt any TWO questions from Q.5 to Q.7. Each part carries 4 marks. **(2 × 8 = 16)**

5: (a) Find the real and imaginary parts of the complex number $\left(\frac{2-i}{2+i}\right)^{-2}$. **(4)**

(b) Use quadratic formula to solve the equation: $\frac{3x-3}{x+1} = \frac{2x-1}{x-1}$, $x \neq -1, 1$ **(4)**

6: (a) Use Cramer's rule to solve the following pair of linear equations: $x + 2y = 7$, $3x - 2y = -3$ **(4)**

(b) The functions f and g are defined such that $f(x) = 4x + 2$ and $g(x) = 6x - 18$. (i) Find $f^{-1}(x)$ and $g^{-1}(x)$. (ii) Find x if $f^{-1}(x) = g^{-1}(x)$. **(4)**

7: (a) Solve the equation: $4x^4 - 27x^2 + 18 = 0$ **(4)**

(b) Solve the triangle ABC, in which $b = 4.8$ cm, $a = 4$ cm, $\beta = 71°$. **(4)**

(Part-III)

Note: Attempt any ONE question from Q.8 and Q.9. Each part carries 4 marks. **(1 × 8 = 8)**

8: (a) If $\underline{a} = 3\underline{i} - \underline{j}$, $\underline{b} = -2\underline{i} + 4\underline{j}$ and $\underline{c} = \underline{i} + 2\underline{j}$, then find unit vector parallel to $3\underline{a} - 2\underline{c} + 4\underline{b}$. **(4)**

(b) Machine A Output (units): 98, 100, 102, 101, 99. Machine B Output (units): 95, 100, 105, 90, 110. (i) Which machine has better performance? (ii) Which machine is more consistent? **(4)**

9: (a) Draw a circle of radius 1.5 cm and draw a tangent at point P, when P is at a distance of 8 cm from its centre. **(4)**

(b) A dice is rolled and coin is tossed together. (i) Find sample space by drawing possibility diagram. (ii) Find sample space by sketching tree diagram. (iii) What is a probability of getting a tail and an even number? **(4)**